REMARKS

The above amendments and these remarks are responsive to the Office Action issued on December 1, 2003. By this response claim 29 is amended. No new matter is introduced. Appropriate support for the amendment can be found in the specification. Claims 1-30 are now active for examination.

The Office Action

The Office Action dated December 1, 2003 rejected claims 1 and 3 under 35 U.S.C. §102(b) as being anticipated by Hulls et al. (U.S. Patent No. 4,178,546). Claim 2 was rejected under 35 U.S.C. §103(a) as being unpatentable over Hulls in view of Sievers et al. (U.S. Patent No. 4,379,990). Claims 1, 4-10 and 16-30 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Sievers. Claims 11-15 were rejected under 35 U.S.C. §103(a) as being obvious over Sievers in view of Bertness (U.S. Patent No. 6,331,762). The Examiner objected to Fig. 4 for formality reasons.

The rejections and objection are respectfully traversed in view of the amendment and remarks presented herein.

The Anticipation Rejection of Claims 1 and 3 Is Traversed

Claim 1 is directed to a method for evaluating operation of an alternator based on the frequency of alternator ripples. Claim 1 recites:

> detecting a frequency component of an alternator output signal representative of a rectified output of the alternator;
>
> comparing the frequency component of the alternator output signal with a threshold frequency; and
>
> evaluating operation of a rectifying circuit of the alternator based on a result of the comparing step.

In rejecting claim 1, the Examiner asserted that Hulls teaches every limitation of claim 1. Applicants respectfully disagree.

Hulls is directed to an alternator tester for testing failed diodes by detecting periodic voltage drop in the alternator output ripple (Abstract; Figs. 2 and 3). Hulls was previously cited in a prior office action issued on October 31, 2002. The rejection was later withdrawn in light of Applicants' traversing arguments pointing out that Hulls does not "*comparing the frequency component of the alternator output signal with a threshold frequency; and evaluating operation of...the alternator based on a result of the comparing step*," as required by claim 1.

According to Hulls: "If one of the diodes becomes open circuited, a negative voltage dip is produced in the alternator ripple voltage as shown at 26 in Fig. 3. Assuming that the normal ripple voltage...is f, as shown in Fig. 2, then the failed diode **voltage dip 26** occurs at a subharmonic frequency f/6 (col. 2, lns. 1-8)." Thus, rather than determining the alternator status based on **by comparing a ripple frequency with a threshold**, as required by the claims, what Hulls discloses is detecting the **appearance** of a **voltage dip** at a specific subharmonic of f (col. 2, lns. 14-21). This is evident from claim 1 of Hulls, in which states "tracking the frequency of and measuring the **amplitude** of a particular subharmonic of said variable frequency f, said **amplitude**, when it exceeds a **given value**, being indicative of a failed diode (col. 4, lns. 3-6)," or from the specification in which states that "the presence of a faulty diode...is detected by measuring the amplitude of a subharmonic of the ripple component (col. 1, lns. 36-39)." In order to achieve these ends, Hulls uses a filter with a specific passing band, such as f/6 or f/x, to detect the appearance of the voltage dip (Fig. 4). In other words, Hulls determines the existence of a defective rectifier by detecting the **appearance** of **periodic voltage dip** in the ripples and comparing the magnitude thereof with a given value.

Since Hulls determines the operation of the alternator based on periodic voltage drop in the ripples, not on the ripple frequencies, Hulls does not "*comparing the frequency component of the alternator output signal with a threshold frequency; and evaluating operation of...the alternator based on a result of the comparing step*," as required by claim 1. As Hulls fails to teach every limitation of claim 1, Hulls cannot support a prima facie case of anticipation. The anticipation rejection is untenable and should be withdrawn. Favorable reconsideration of claim 1 is respectfully requested.

Claim 3 depends on claim 1 and incorporates every limitation thereof. Thus, the obviousness rejection of claim 3 based on Hulls is traversed based on its dependency as well as on its own recitation. Favorable reconsideration of claim 3 is respectfully requested.

The Obviousness Rejection of Claims 1, 4-10 and 18-22 Is Traversed

Claims 1-10 and 18-22 are rejected as being obvious over Sievers. As discussed earlier, claims 1 is directed to a method for evaluating operation of an alternator based on the frequency of alternator ripples, and recites "comparing the frequency component of the alternator output signal with a threshold frequency." Claims 4 and 18 are system claims having components for performing functions comparable to the steps described in claim 1.

In rejecting claims 1, 4 and 18, the Examiner contended that Sievers teaches every limitation of the claims. Sievers discusses a detector for monitoring the function of a stator and rectifying diodes in a multiphase alternator battery charging system. The Examiner contended that the ripple detector 88 in Sievers compares the frequency component of the alternator output signal with a threshold frequency; and the logic module 102 evaluates the operation of the alternator based on a result of the comparison conducted by the ripple detector 88 (See item 4 of the Office Action). Alternatively, the Examiner asserted that the Stator Detector 92 and the logic

module 102, combined, perform a comparison of ripple frequency and a threshold frequency. Applicants respectfully disagree.

It is respectfully submitted that Sievers does not describe using ripple frequencies to evaluate the health of an alternator. Instead, Sievers evaluates the alternator operation based on ripple voltages. According to Sievers, the ripple detector 88 is used to determine the **ripple voltage level**, not the **ripple frequency**. The threshold value is **a threshold voltage**, not **a threshold frequency**. Such differences are evident from the descriptions provided in col. 15, lns. 8-20, and col. 16; lns. 8-17, where it was described that "[i]f the **ripple level** of a given speed and field current is too large, OP AMP 500 produces a Ripple Detector Output signal to trigger a fault indication." (emphasis added) Thus, Sievers performs a fault detection based on ripple levels, not frequencies.

Furthermore, Stator Detector 92 and the logic module 102, combined, do not perform a comparison of ripple frequency and a threshold frequency as alleged by the Examiner. According to Sievers, the Stator Detector 92 "provides an output signal indicative of the functioning of the stator and the positive and negative diodes" based on "three **phase** signals $\varphi 1$, $\varphi 2$, and $\varphi 3$ (see Figs. 2 and 8; and col. 17, lns. 56-60). Thus, Stator Detector 92 and the logic module 102, combined, do not perform a comparison of the ripple frequency and a threshold frequency, as required by claims 1, 4 and 18. Therefore, Sievers does not disclose comparing the frequency component of the alternator output signal with a threshold frequency, as described in claims 1, 4 and 18.

As Sievers fails to disclose every feature of claims 1, 4 and 18, Sievers cannot support a prima facie case of obviousness. The obviousness rejection is untenable and should be withdrawn. Favorable reconsideration of claims 1, 4 and 18 is respectfully requested.

Claims 5-10 depend on claim 4, directly or indirectly, and incorporate every limitation thereof. Thus, the obviousness rejection of claims 5-10 is traversed in view of their dependency. Favorable reconsideration of claims 5-10 is respectfully requested.

The Obviousness Rejection of Claim 2 Is Traversed

Claim 2 depends on claim 1, and is rejected as being obvious over Hulls in view of Sievers. As discussed relative to claim 1, both Hulls and Sievers fail to teach comparing the ripple frequency with a threshold frequency as required by claim 1. Thus, Hulls and Sievers, even combined, do not teach every limitation of claim 2 based on its dependency of claim 1. Favorable reconsideration of claim 2 is respectfully requested.

The Obviousness Rejection of Claims 11-15 Is Traversed

Claims 11-15 depend on claim 4 and incorporate every limitation thereof. The Office Action rejected claims 11-15 as being obvious over Sievers in view of Bertness. Applicants respectfully disagree.

As already discussed relative to claim 4, Sievers does not teach comparing the ripple frequency with a threshold frequency as required by claim 4. Therefore, Sievers does not to teach every limitation of claims 11-15 through their dependencies on claim 4. Bertness is cited by the Examiner for teaching the use of a database that stores threshold data, and does not alleviate the deficiency of Sievers. Thus, Sievers and Bertness, even combined, do not disclose the features described in claims 11-15. Consequently, the obviousness rejection of claims 11-15 is untenable and should be withdrawn. Favorable reconsideration of claims 11-15 is respectfully requested.

The Obviousness Rejection of Claims 16-24 Is Traversed

Claims 16-24 are rejected as being obvious over Sievers. Independent claims 16 and 23 are directed to a system for evaluating the operation of an alternator using an adaptive threshold device for generating a reference threshold based on the level of the alternator output signal according to a predetermined rule. A comparator is used to compare the level of the alternator output signal with the reference threshold, and generates a frequency signal indicating the frequency component of the alternator output signal. A controller then *compares the frequency component of the alternator output signal with a threshold frequency*, and generates an indication signal indicating the operation of the alternator.

It is respectfully submitted that Sievers does not teach the features described in claims 16 and 23. As discusses earlier relative to claim 1, Sievers does not compare the frequency component of the alternator output signal with a threshold frequency as required by claims 16 and 23. As Sievers fails to teach every limitation of claims 16 and 23, Sievers cannot support a prima facie case of obviousness. Accordingly, the obviousness rejection based on Sievers is untenable and should be withdrawn. Favorable reconsideration of claims 16 and 23 is respectfully requested.

Claims 17 and 24 depend on claims 16 and 23, respectively, and incorporate every limitation thereof. Therefore, the obviousness rejection of claims 17 and 24 based on Sievers is also untenable and should be withdrawn in view of their respective dependencies. Favorable reconsideration of claims 17 and 24 is respectfully requested.

The Obviousness Rejection of Claims 25-30 Is Traversed

Claims 25-30 were rejected as being obvious over Sievers. The rejection is respectfully traversed because Sieves fails to disclose every limitation of the claims.

Independent claims 25, 27 and 29 relate to a method and apparatus for determining the health of an alternator based on a ripple frequency of an alternator output obtained from terminals of a battery coupled to the alternator. As discussed earlier, Sievers fails to teach comparing the frequency component of the alternator output signal with a threshold frequency as required by the claims. As Sievers fails to teach every limitation of claims 25, 27 and 29, Sievers cannot support a prima facie case of obviousness. Accordingly, the obviousness rejection based on Sievers is untenable and should be withdrawn. Favorable reconsideration of claims 25, 27 and 29 is respectfully requested.

Claims 26, 28 and 30 depend on claims 25, 27 and 29, respectively, and incorporate every limitation thereof. Thus, for at least the same reasons discussed relative to claims 25, 27 and 29, the obviousness rejection of claims 26, 28 and 30 based on Sievers is untenable and should be withdrawn based on their respective dependencies of claims 25, 27 and 29. Favorable reconsideration of claims 26, 28 and 30 is respectfully requested.

The Objection of Fig. 4 is Addressed

The Examiner objected to Fig. 4 for lacking text labels for boxes 312, 314, 316, 332 and 352. By this Response, a replacement drawing with added text labels is submitted. Fig. 4 is now in proper form.

CONCLUSION

Therefore, the present application claims subject matter patentable over the references of record and is in condition for allowance. Favorable reconsideration is respectfully requested. If there are any outstanding issues that might be resolved by an interview or an Examiner's amendment, Examiner is requested to call Applicants' attorney at the telephone number shown below.

To the extent necessary, a petition for an extension of time under 37 C.F.R. 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 500417 and please credit any excess fees to such deposit account.

Respectfully submitted,

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